

CATALINA CALIFORNIA QUAIL (*Callipepla californica catalinensis*)

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Criteria Scores

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
10	0	5	10	10	0	5

Special Concern Priority

Currently considered a Bird Species of Special Concern (year-round), Priority 3. This subspecies was not included on the original prioritized list (Remsen 1978), or on CDFG's (1992) unprioritized list.

Breeding Bird Survey Statistics for California

Data inadequate for trend assessment at the subspecies level (Sauer et al. 2000). A 10-yr (1989-1998) average of 84.43 birds recorded/route using breeding bird survey (BBS) data (USGS 2001). Based on the BBS data, this is the second most common breeding landbird on Santa Catalina Island.

General Range and Abundance

The Catalina California quail is endemic to California where it is resident on Santa Catalina island (Grinnell and Miller 1944, AOU 1957). This subspecies has been successfully introduced on Santa Rosa and Santa Cruz islands but an introduction to San Nicolas island was unsuccessful (Townsend 1968, Jones and Collins in press). Today the Catalina California quail is a very common to abundant resident on Santa Catalina and a common to very common resident on Santa Cruz and Santa Rosa islands (Jones and Collins in press).

Seasonal Status in California

Occurs year round; breeding season extends from mid-April until mid-July (Jones and Collins in press).

Historical Range and Abundance in California

Grinnell and Miller (1944) described the Catalina California quail as a “common to abundant” resident of Santa Catalina island and also mention that an introduced population occurs on Santa Rosa island. California quail from adjacent mainland populations (*C. c. californica*) were introduced unsuccessfully on Santa Cruz island sometime prior to 1875 (Henshaw 1876) and on San Clemente island first in the later part of the 19th century (Grinnell 1897) and then again around 1913 (Howell 1917). Quail from Santa Catalina island (*C. c. catalinensis*) were introduced to Santa Cruz island in the late 1940s, to Santa Rosa island sometime between 1935 and 1940, and to San Nicolas island in June 1962 (Jones and Collins in press). The introductions of *C. c. catalinensis* to Santa Cruz and Santa Rosa islands were successful while the San Nicolas island introduction was unsuccessful (Townsend 1968, Jones and Collins in press).

Santa Rosa Island. There are no quantitative estimates of historic abundance for the introduced quail population on this island. The first and only mention of Catalina California quail on Santa Rosa prior to 1945 was in 1941 when the species was “seen occasionally, in pairs or small groups” (A. H. Miller unpubl. data). By 1944, the species was “apparently introduced and established on Santa Rosa Island” (Grinnell and Miller 1944:124).

Santa Catalina Catalina Island. No quantitative estimates of historic abundance exist. However, the species appears to have been common to abundant on Santa Catalina since it was first reported on the island in the 1860s by J. G. Cooper (1870). C. P. Streater (unpubl. data) reported that quail were “abundant in the canons” in April 1892 while Richardson (1908) found them “abundant” in April 1905 and 1906. Since then the species has been listed as a “common” (Willett 1912, Grinnell et al. 1918), “abundant” (Willett 1933) and “common to abundant” resident (Grinnell and Miller 1944).

Initially it was rumored that quail from the mainland were introduced on Santa Catalina island. However, Grinnell (1906) reported that James C. Johnston, an early island resident, and

sheep men on the island considered quail to be native. J. C. Johnson arrived on Santa Catalina island in 1859 and lived there for 21 years (Grinnell 1906). Specimens collected during the late 1880s and 1890s (USNM and SDMNH specimens) support Grinnell's (1906) belief that the birds on Santa Catalina island were native to the island and were not introduced recently from the mainland by early settlers. Dickey and Van Rossem (1922:34) reexamined the taxonomic validity of *C. c. catalinensis* and concluded that it was well differentiated from mainland California quail subspecies and that the "pronounced characters preclude the possibility of artificial introduction." Johnson (1972) argued persuasively that quail were introduced to Santa Catalina by Native Americans approximately 12,000 years ago. The fact that genetically *C. c. catalinensis* is no more divergent from mainland birds than mainland birds are from themselves (Zink et al. 1987) is consistent with Johnson's (1972) hypothesis. A genetic study using mitochondrial and single-locus micro-satellite DNA should help to clarify the length of isolation required to generate the phenotypic and genetic differences observed in *C. c. catalinensis* on Santa Catalina island.

Recent Range and Abundance in California

The breeding range of the Catalina California quail has expanded during the past century. Introduced *C. c. catalinensis* populations now occur on Santa Rosa and Santa Cruz islands. An unsuccessful attempt was made to introduce *C. c. catalinensis* to San Nicolas island in 1962 (Townsend 1968). Vegetation striping from more than 150 years of overgrazing and rooting by a variety of feral herbivores (goats, sheep, bison, cattle, mule deer and blackbuck antelope) and feral pigs has degraded scrub and woodland habitats known to be used by Catalina California quail. It is unclear whether this has had a positive or negative affect on the quail population on Santa Catalina. Since there is no data on what quail numbers were like on Santa Catalina prior to the introduction of non-native grazing mammals, it is hard to know if their populations have been impacted or enhanced. The fact that they have been noted as either common or abundant both prior to 1944 and

up to the present seems to suggest that vegetation changes wrought by feral mammal grazing and rooting has not resulted in a significant reduction in quail numbers on Santa Catalina island.

Santa Rosa Island. There is no quantitative estimate of current abundance of quail on Santa Rosa island. A. H. Miller (unpubl. data) reported seeing occasional pairs or small groups of quail in March 1950. By the mid-1970s quail were “common” and widely distributed on Santa Rosa island (P. W. Collins unpubl. data, H. L. Jones unpubl. data). However, by 1986, they appear to have declined in overall abundance (P. W. Collins unpubl. data).

Santa Cruz Island. There is very little quantitative data regarding the abundance of Catalina California quail on Santa Cruz island. *C. c. catalinensis* were introduced to Santa Cruz island between 1946 and 1948 when 150-200 birds were released on the island (Jones and Collins in press). By the late 1960s quail were listed as “common” (J. M. Diamond unpubl data) and “abundant” (J. V. Lynch unpubl. data). By the early 1970s, there were “thriving populations” of quail on Santa Cruz island (Yeaton 1974:964), and by the 1980s the species had become widespread and “abundant” on the island (Laughrin 1982). Today the Catalina California quail are a common to abundant, widely distributed breeding resident on Santa Cruz island (L. Laughrin pers. comm., P. W. Collins unpubl. data).

Santa Catalina Island. There is at present only limited quantitative data regarding the recent abundance of quail on Santa Catalina island. In 1968, J. M. diamond (unpubl. data) reported that quail on Santa Catalina island were “much commoner than on the mainland.” Jones (1976) listed them as “common and widely distributed” and by 1991 he recorded them as a “very common resident” (H. L. Jones unpubl. data). Today, Catalina California quail are “one of the most abundant breeding land birds on the island” (Jones and Collins in press). Breeding Bird Survey (BBS) data from 1989-1998 (USGS 2001) and Christmas Bird Counts (CBCs) between 1988-1997 support the fact that today this species may be one of the more abundant resident breeding land birds on Santa Catalina island. An average of 84.43 quail were encountered per 2.5 hours of point

counts along a BBS route run on Santa Catalina (USGS 2001), and an average of 88.73 birds were counted per party hour during ten years of CBCs at Santa Catalina island.

Ecological Requirements

The ecological requirements of the Catalina California quail are largely undescribed. However, Grinnell et al. (1918: 538) stated that it's "general natural history is probably nearly identical with that of the Valley Quail." Grinnell and Miller (1944: 124) described its preferred habitat on Santa Catalina as "hillsides and ravine bottoms where grown more or less thickly to brush-plants of several kinds. Shady north slopes where growth of certain bushes is taller are especially favored, as also places where tracts of brush are interspersed with patches of tuna cactus." Jones (1976) reported it as "common and widely distributed on the island in coastal sage, chaparral and woodland communities." Quail are generally "found everywhere there is ground cover" (H. L. Jones unpubl. data). On Santa Cruz and Santa Rosa islands, Catalina California quail are found in coastal sage scrub, chaparral, woodlands and pine forests (Laughrin 1982, P. W. Collins unpubl. data). Like California quail on the mainland, *C. c. catalinensis* seems to prefer the edges of scrub and woodland habitats where there is low protective cover, open foraging areas, and water sources (P. W. Collins unpubl. data). Catalina California quail are usually found associated with edges or openings along trails, roads, disturbed areas, or localized areas in otherwise dense tracks of scrub and woodland habitats. Dominant shrubs associated with *C. c. catalinensis* habitat on the Channel Islands include: California sagebrush (*Artemisia californica*), California encelia (*Encelia californica*), deerweed (*Lotus scoparius*), coyote brush (*Baccharis pilularis*), buckwheat (*Erigonum arborescens* and *E. grande*), black sage (*Salvia mellifera*), sumacs (*Rhus integrifolia* and *Malosma laurina*), prickly pear cactus (*Opuntia oricola* and *O. littoralis*), poison oak (*Toxicodendron diversilobum*), giant rye (*Leymus condensatus*), manzanita (*Arctostaphylos* spp.), ceanothus (*Ceanothus* spp.), toyon (*Heteromeles arbutifolia*), lupines (*Lupinus* spp.), mountain mohogany (*Cercocarpus betuloides*),

chamise (*Adenostema fasciculatum*), monkey flower (*Mimulus* spp.), island cherry (*Prunus ilicifolia*), buckthorn (*Rhamnus* spp.), and scrub oak (*Quercus dumosa*).

California quail is generally a sedentary species that only tends to move seasonally within its home range. They require “cover for roosting, escaping, and loafing, water, and broken/disturbed spaces for foraging (Calkins et al. 1996:6). Cover is important to quail because it “provides shade, shelter from inclement weather, and perhaps most importantly, refuge from predators for adults and broods” (Shuford 1993:161). Average cover on a site inhabited by California quail in Baja California was 47% shrubby, 27% bare or rocky, 23% herbaceous, and 3% arborescent (Koford 1987). Suitable cover for quail needs to be “dense at ground level and impervious to penetration by avian predators” (Shuford 1993:161). On the mainland, California quail are generally found in “chaparral, sagebrush scrub, grassland oak and riparian and foothill woodlands”, and typically avoid heavy woods and areas of intensive agriculture (Calkins et al. 1996:6). California quail feed primarily on seeds and green leafage and flowers from forbs, grasses, shrubs and trees but also occasionally feed on catkins, plant galls, berries, fruits, buds, blossoms and insects (Shuford 1993, see review in Calkins et al. 1999). They consume approximately 1%-7% animal matter (insects, millipedes, mites, spiders, snails, and sowbugs) during the spring and early summer (Leopold 1977, Shuford 1993). The fall diets of Catalina California quail (n=145) is comprised of 44.8% grasses, 42.5% herbs, 8.5% shrubs and 4.3% miscellaneous food items (Leopold 1977:246). Most of this diet is comprised of seeds and green leafage of herbs, such as filaries (*Erodium* spp.), clovers (*Medicago*), snake-root (*Sanicula* spp.), lupines (*Lupinus* spp.), lotuses (*Lotus* spp.), and from a variety of annual grasses (*Bromus* spp.), wild oats (*Avena fatua*), and barley (*Hordeum* spp.) (Leopold 1977). Introduced annual grasses that now dominate grasslands on the islands do not appear to be an important element of the diet of Catalina California quail. In fact, as Shuford (1993) has suggested, these annual grasses may in fact compete with and even displace broadleaved annuals that are known to be important quail foods. Quail foraging areas provide a “sparse to

moderately dense growth of annual grasses and particularly forbs, with a duff or litter layer that harbors fallen seeds” (Shuford 1993: 161). California quail usually forage on the ground by grazing on annual plants and by scratching the soil and litter; they also occasionally jump to reach blossoms and climb shrubs and trees to feed on berries, flowers and catkins (Shuford 1993, Calkins et al. 1999). Chicks and juveniles typically forage close to escape cover while adults usually forage within about 15 m of escape cover and occasionally up to 90 m from cover when aerial predators are absent (Shuford 1993, Calkins et al. 1999). California quail usually locate their nests in open areas away from a continuous canopy of shrubs or trees (Leopold 1977). Nests are well concealed and are generally placed on the ground in dense clumps of grass, weeds or dead bushes, often being sheltered at the base of bushes and logs, beneath overhanging rocks, in niches in narrow gullies, or in rock crannies (Ehrlich et al. 1988, Shuford 1993, Calkins et al. 1999). California quail often nest at sites exhibiting early stages of plant succession, and in locations with more bare ground, and less grass, shrub and vertical cover (reviewed in Calkins et al. 1999). In productive years, pairs will occasionally raise two broods.

There are no studies available regarding the factors that limit Catalina California quail populations. Although a variety of extrinsic factors are probably responsible for regulating quail populations on the Channel Islands, climatic and vegetative structure factors are probably two of the more important. Botsford et al. (1988) determined that the levels of January-March rainfall accounted for 76% of the variance in reproductive success in the unhunted Catalina California quail population on Santa Cruz island. Rainfall prior to the start of quail nesting season apparently increased reproductive success by contributing to growth of food plants, while rainfall during the nesting season decreased breeding success by increasing mortality of newly hatched chicks (reviewed in Calkins et al. 1999). Degradation of scrub and woodland habitats on Santa Catalina, Santa Cruz and Santa Rosa islands from more than 150 years of intensive grazing by a variety of feral herbivores and rooting by feral pigs has undoubtedly had an adverse affect on suitable

breeding and foraging habitat for Catalina California quail populations. Moderate to heavy grazing by feral herbivores on these islands has altered scrub and woodland community structure by depleting the herbaceous layer, reducing foliar cover and species richness, eliminating survival of propagules, and increasing erosion (Van Vuren and Coblenz 1987, Klinger et al. 1994, Laughrin et al. 1994). Changes in the areal extent and structure of scrub and woodland habitats on the Channel Islands from this unregulated grazing has undoubtedly reduced the size of quail populations on each of the islands on which they are found today. Nest and fledgling predation by ground-based mammalian and reptilian and aerial avian predators has probably increased as a result of the structural changes that have been wrought by feral herbivore grazing on scrub and woodland habitats. Nest predation by California ground squirrels (*Spermophilus beecheyi*) was shown to reduce California quail nesting success in areas with large ground squirrel populations (Glading 1938, Horn 1938). Ground squirrel predation may be a factor regulating the Catalina California quail population on Santa Catalina island since California ground squirrels (*S. b. nesophilus*) are widespread and abundant on this island. Predation from introduced mammals such as feral cats (*Felis catus*), feral pigs (*Sus scrofa*), and black rats (*Rattus rattus*) is an additional factor affecting quail populations on Santa Catalina island. A variety of predators native to the islands are undoubtedly causing mortality in Catalina California quail populations, however there is no quantitative data regarding the extent of this predation. The following species undoubtedly play a role in regulating quail populations on the islands: American kestrel (*Falco sparverius*), island scrub-jay (*Aphelocoma insularis*), California ground squirrel, and island fox (*Urocyon littoralis*). Thus, nest and fledgling predation from native and introduced predators, coupled with degradation of preferred scrub and woodland breeding habitats by past feral herbivore grazing and current feral pig rooting (Santa Catalina and Santa Cruz islands) are important factors that could be limiting *C. c. catalinensis* populations.

Threats

Loss, fragmentation and degradation of scrub and woodland habitats from nearly 150 years of overgrazing by feral herbivores and rooting by feral pigs, increased levels of nest predation from native and nonnative predators, change in vegetative cover and structure following removal of feral herbivores, and long-term fire suppression that promotes growth of impenetrable brush are the principal factors that threaten Catalina California quail populations. Alteration of native scrub and woodland habitats by feral herbivore grazing and feral pig rooting have increased the susceptibility of ground nesters like the Catalina California quail to predation from both native (island fox, American kestrel, and island scrub-jay) and nonnative (feral cat, black rat and feral pig) nest predators. Predation is a major cause of mortality in California quail during all stages of life (Calkins et al. 1999). As feral herbivores and feral pigs are eradicated from the Channel Islands, it is unknown what the long-term effects will be to Catalina California quail populations. Scrub and woodland habitats are expected to show increased germination and seedling survivorship, increased vegetative vigor, and increased overall vegetative cover (Coblentz 1977, Wehtje 1991, Klinger et al. 1994, Laughrin et al. 1994). Over the long-term, this will lead to the development of broad, dense, decadent stands of scrub (chaparral and coastal sage scrub) and woodland (ironwood, oak and conifer woodlands) habitats. California quail are known to avoid heavy woods and areas of scrub that are not broken by open spaces vegetated with annuals (see review in Calkins et al. 1999). Catalina California quail are expected to abandon scrub and woodland habitats once the vegetative cover becomes too dense. This is expected to result in a reduction in the extent and quality of quail breeding and foraging habitat, which in turn could result in an overall decline in the relative abundance of quail on the islands. Controlling or eliminating episodic factors such as fire or light to moderate grazing will, over the long-term, lead to the development of dense, decadent stands of scrub and woodland habitats. As vegetative cover increases on the islands, fire frequency and intensity is also expected to increase. On the mainland, regular, small fires in chaparral tend to

promote the growth of annuals in burned-out spaces which in turn benefits California quail populations (Calkins et al. 1999). However, infrequent “hot” fires tend to reduce California quail populations through a reduction in usable habitat (Duncan 1968).

Management and Research Recommendations

- Conduct research to identify specific habitat requirements (vegetative and physiographic) and ecological conditions that will support self-sustaining populations; in particular determine demographic rates for each of the island populations.
- Initiate studies to examine how fire can be used in scrub and woodland habitats on the islands to help maintain and/or promote suitable breeding and foraging habitat for Catalina California quail. Determine the frequency and intensity of controlled burns needed to promote habitat for Catalina California quail.
- Finish implementing the ecological restoration and feral animal eradication programs that have been proposed by the Santa Catalina Island Conservancy for Santa Catalina island and by the NPS for Santa Cruz island (NPS 2001).
- Initiate field studies designed to gather basic descriptive attributes (e.g. phenology, breeding biology, ecology, food habits, population demography (life tables), behavior, and behavioral ecology) that can be used to fill in data gaps that exist in nearly all aspects of the life history of the Catalina California quail.
- Gather more detailed data on the distribution and relative abundance of *C. c. catalinensis* populations on Santa Catalina, Santa Cruz and Santa Rosa islands.
- Develop and implement a more intensive species-specific monitoring program designed to better detect possible population declines in *C. c. catalinensis* populations on each of the islands on which this taxa currently occurs. Such a monitoring program would generate data that could

be used to promote a better understanding of the population dynamics of this unique Channel Island endemic.

- Implement a genetic study using mitochondrial and single-locus micro-satellite DNA analyses to elucidate the genetics, phylogeny, and taxonomic relationships of the Catalina California quail. Such a study could also be useful in determining the population genetic structure of each of the Catalina California quail populations.
- Develop and implement a program to control and/or eradicate feral cats on Santa Catalina island. The ultimate goal of such a program should be the complete eradication of feral cats from Santa Catalina island. Failing this, the feral cat control program should be designed to reduce the overall level of predation that this introduced predator is having on the Catalina California quail population.

Monitoring Needs

An existing USFWS Breeding Bird Survey (BBS) and National Audubon Society Christmas Bird Count (CBC) are providing some useful data for monitoring changes in the population dynamics of Catalina California quail populations of Santa Catalina island. However, there are no BBS or CBC counts currently being conducted annually on Santa Cruz or Santa Rosa islands, and both of these types of surveys do not permit one to monitor population changes with respect to changes in habitats. A landbird monitoring program implemented by the NPS on Santa Rosa island (Super et al. 1991) is currently in the process of being redesigned to use variable circular plots (VCPs) as the basic field unit for monitoring landbird density (McEachern 2000, L. Dye pers. comm.). The Santa Catalina Island Conservancy is also in the process of setting up a similar off-trail VCP-based landbird monitoring program on Santa Catalina island (J. Floberg pers. comm.). Both of these monitoring programs should develop data that can be used to promote an index of breeding population size, and to monitor overall population changes with respect to changes in habitats. Both

programs are systematically placing VCPs in habitats so that data gathered by these monitoring programs can be analyzed by each of the major habitats. Annual monitoring of quail populations on the Channel Islands should use standardized off-trail VCP counts. Attempting to estimate demographic variables (annual adult survival and breeding productivity) using constant-effort mist netting methods of the Monitoring Avian Productivity and Survival (MAPS) program may not be feasible with this species. Extensive mist netting on the islands in the types of scrub and woodland habitats that this species prefers is difficult, and the island logistics and weather place significant logistical constraints on mist net sampling on the islands.

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